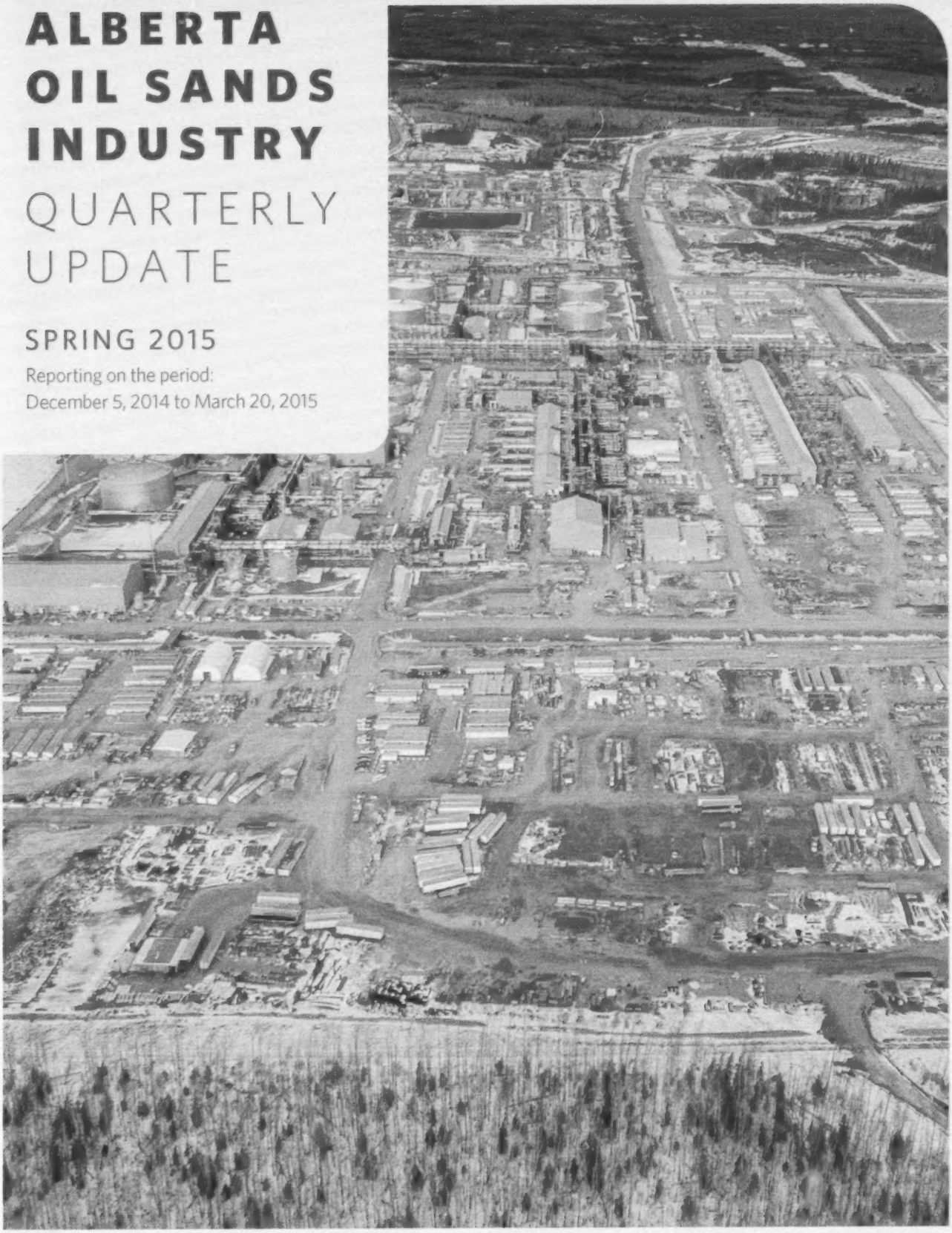
ALBERTA OIL SANDS INDUSTRY QUARTERLY UPDATE

SPRING 2015

Reporting on the period:
December 5, 2014 to March 20, 2015



All about the oil sands

Background of an important global resource

ON THE COVER

ConocoPhillips Canada's Surmont 2 SAGD project, located south of Fort McMurray, will start operations this year. At 118,000 bbls/d, it is the largest single SAGD phase ever built.

COVER PHOTO: CONOCOPHILLIPS CANADA

TABLE OF CONTENTS

3 **Mapping the oil sands**

4 **Government update**

6 **Labour market update**

7 **What's new in the oil sands: business**

8 **What's new in the oil sands: technology**

9 **Oil sands production data**
Production by extraction method, aggregate synthetic crude oil and bitumen production

Oil sands technology guide

10 **Project listings**

16 **Glossary**

18 **Oil sands contacts**

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Canada has the third-largest oil reserves in the world, after Saudi Arabia and Venezuela. Of Canada's 173 billion barrels of oil reserves, 170 billion barrels are located in Alberta, and about 168 billion barrels are recoverable from bitumen. This is a resource that has been developed for decades but is now gaining increased global attention as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 168 billion barrels of bitumen represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be significantly increased. In fact, total oil sands reserves in place are estimated at 1.8 trillion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, which is located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest-central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

For the first time in 2012, in situ oil sands production exceeded mined oil sands production in Alberta. In 2013, 53 per cent of the province's oil sands volumes were produced using in situ methods. Alberta will continue to rely to a greater extent on in situ production in the future, as 80 per cent of the province's proven bitumen reserves are too deep underground to recover using mining methods.

There are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and the melted bitumen flows into the lower well via gravity and is pumped to the surface using artificial lift.

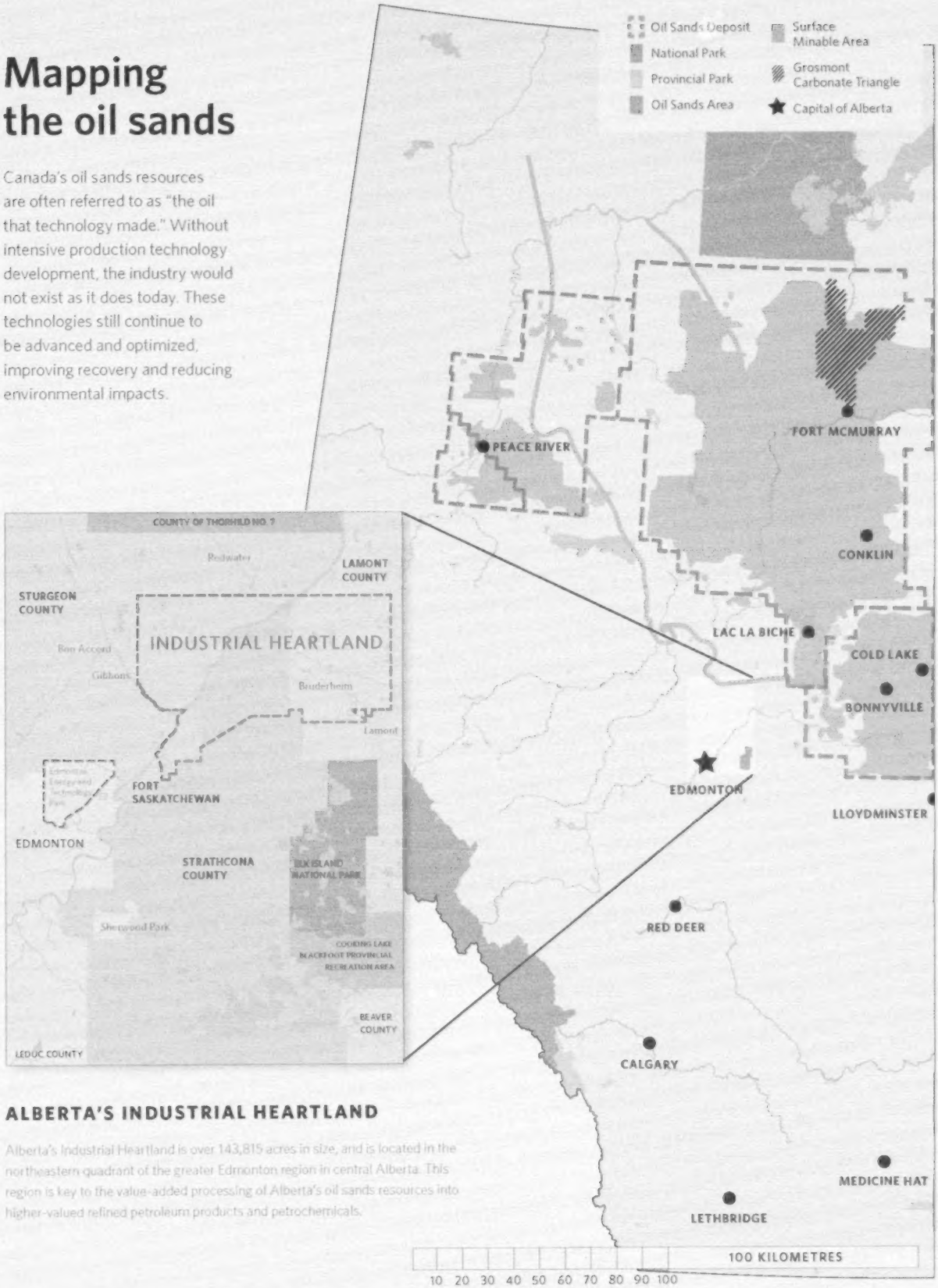
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The selection is based on a number of factors, including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production, including variations on solvent-assisted SAGD and CSS, recovery using electricity and in situ combustion.

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil, which is a refinery feedstock. That can be transformed into transportation fuels and other products. ■

Mapping the oil sands

Canada's oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.



ALBERTA'S INDUSTRIAL HEARTLAND

Alberta's Industrial Heartland is over 143,815 acres in size, and is located in the northeastern quadrant of the greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher-valued refined petroleum products and petrochemicals.

GOVERNMENT UPDATE

Alberta Government

ALBERTA STRENGTHENS ENVIRONMENTAL PROTECTIONS IN THE OIL SANDS

As part of ongoing efforts to reduce the environmental impact of oil sands development, Alberta has introduced new steps to reduce tailings ponds and regulate the use of water from the Athabasca River.

The tailings management framework focuses on getting tailings ponds remediated faster and slowing tailings ponds growth. Tailings are currently managed through the Alberta Energy Regulator's Directive 074, which does not set timelines for the remediation of existing ponds.

The surface water quantity management framework establishes stringent water use requirements for both current and future minable oil sands operators. At present, this industry uses one per cent of water from the river annually.

"Alberta's oil sands region is already one of the most protected and regulated energy development areas in the world," says Kyle Fawcett, Minister of Environment and Sustainable Resource Development.

"To enhance this level of protection we need systems that continue to drive innovation. Industry must continually improve its management of wastes like tailings and respect the full range of water management opportunities that exist in the region."

Highlights of the tailings management framework include:

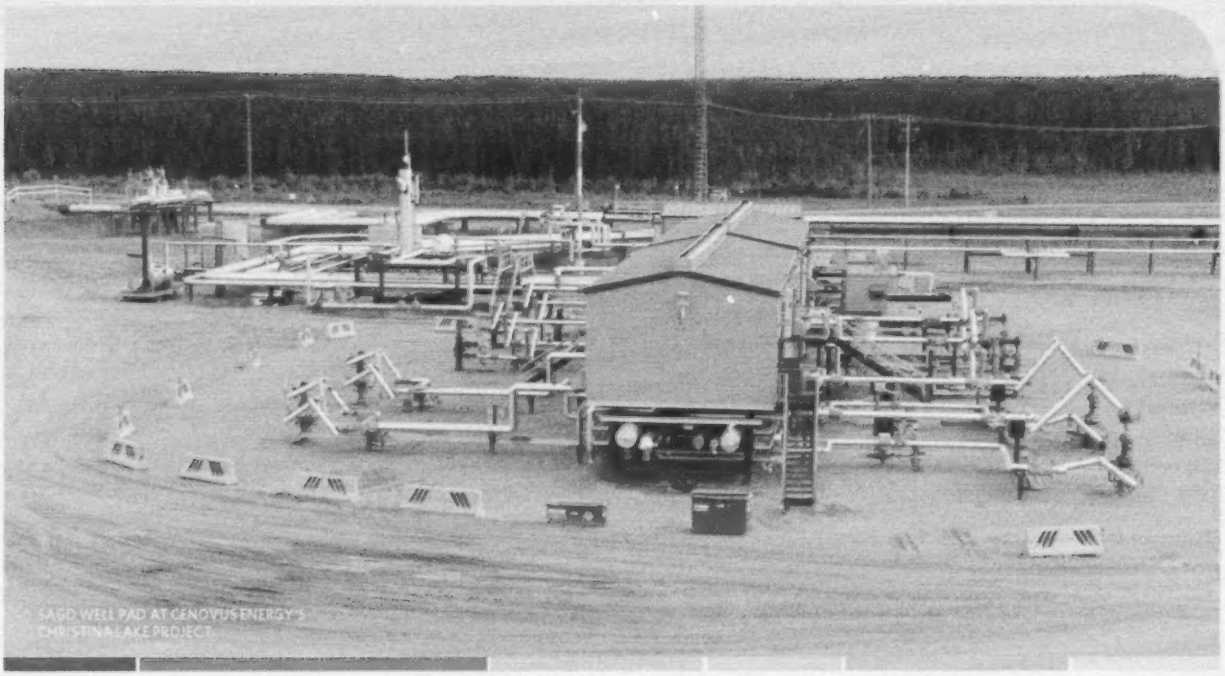
- limiting the amount of tailings that can be accumulated;
- pushing companies to invest in technology to remain within those constraints;
- establishing firm thresholds to identify when companies must take action to prevent harm to the environment; and
- requiring companies to post additional financial security to deal with potential remediation issues through the Conservation and Reclamation Regulation and ensuring tailings are progressively treated and reclaimed throughout the project life cycle and are ready to reclaim within 10 years of the end-of-mine life of that project.

Highlights of the surface water quantity management framework include:

- requiring the majority of water used by existing operators and all water used by new operators to stop during low-flow periods;
- restricting water use during these low-flow periods to a minimum for older operators who are technologically unable to stop all withdrawals;
- establishing weekly triggers, which act as an early warning point before a limit is reached, and setting water withdrawal limits for all minable oil sands operators using best-available science; and
- maintaining an adequate quantity of water for aboriginal river navigation and pursuit of traditional activities.

The Alberta government worked with industry, aboriginal groups, environmental non-governmental organizations and other stakeholders to develop these frameworks that will guide progress on environmental issues in the oil sands.

The *Tailings Management Framework For The Minable Athabasca Oil Sands* and *Surface Water Quantity Management Framework For The Lower Athabasca River* were proposed under Alberta's Lower Athabasca Regional Plan. The surface water quantity framework also supports the Water Conversation's theme of managing industrial water use.



SAGD WELL PAD AT CENOVUS ENERGY'S CHRISTINA LAKE PROJECT

PREMIER PRENTICE'S STATEMENT ON PRESIDENT OBAMA'S DECISION TO VETO KEYSTONE XL LEGISLATION

Premier Jim Prentice issued the following statement after U.S. President Barack Obama vetoed legislation that would have approved the Keystone XL Pipeline:

"I am disappointed but not surprised that President Obama chose to veto bipartisan legislation that would have approved the Keystone XL Pipeline.

"While [this] decision was expected, it does not change the fact that Keystone XL would advance North American energy security and prosperity while offering the U.S. access to responsibly developed energy from a close ally and friend.

"Our commitment to responsible energy development is steadfast, and our environmental standards are much greater than those of other countries that send their oil to the U.S. market every day. Alberta is the only major supplier of oil to the U.S. with a price on carbon.

"Canadian and American producers have long adjusted their plans and have been successful delivering additional barrels to the U.S. market through other pipelines and rail options. As a result, our crude exports to the U.S. are forecast to increase this year.

"The debate will continue and, just as I did during my recent visit to Washington, I will continue to communicate Alberta's record as a safe, secure and reliable energy supplier and our strong support for Keystone XL and for all infrastructure projects that advance North America's energy interests."

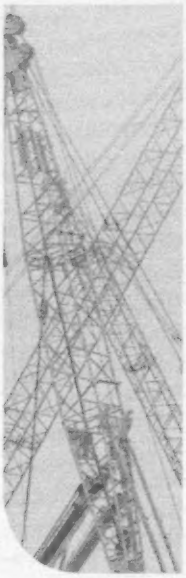
GOVERNMENT ACTING ON AUDITOR GENERAL'S REPORT

Part of the Alberta government being under new management is how it acts on recommendations from Alberta's auditor general. The auditor general issued a report in February that included recommendations on pipeline safety and reliability. Minister of Energy Frank Oberle issued the following response:

"The auditor general provided six recommendations to the Alberta Energy Regulator to improve its Pipeline Safety and Reliability program, including using risk management in allocating resources, improving measures to assess industry performance, expanding analysis of incidents beyond primary causes and sharing lessons learned with industry.

"Pipeline safety is important to Albertans, and I am pleased that the auditor general has found that we have a well-functioning system with effective oversight and enforcement. I appreciate the auditor general's recommendations to further improve our pipeline regulatory system. The Alberta Energy Regulator is taking action to implement the recommendations." ■

LABOUR UPDATE



PETROLEUM HUMAN RESOURCES COUNCIL OF CANADA: LABOUR IMPACTS OF PRICE DROP WILL BE SHORT TERM

The Petroleum Human Resources Council of Canada (PHR) says that while the impacts of the current low oil price will be felt most strongly in the western provinces, 550,000 Canadians who are directly or indirectly employed by the industry across the country will undoubtedly begin to feel the effects of reduced commodity prices to varying degrees.

"We are viewing the impacts of the direct and indirect oil and gas workforce as short term," says Carol Howes, new director of PHR in the first of four instalments of the group's *Petro Prices to Petro People* report. PHR says this outlook is also congruent with a Canadian Imperial Bank of Commerce prediction that Canada's oil industry will see a "mild and temporary" recession this year.

"Yes, there will be a slowdown on industry expansion activity and hiring, but this might actually provide temporary relief from labour and skill shortages challenging the industry in the long term," says Howes. She suggests that companies will focus more on core activities in their business to continue with current production.

Howes adds, "This means they will need to maintain their current workforce."

However, PHR notes that layoffs are occurring, especially with contract/contingent, temporary or project-based workers, as more long-term projects are deferred or cancelled.

ABORIGINAL CONSTRUCTION PROGRAM BUILDS OPPORTUNITIES

A two-year pilot program co-sponsored by the Alberta government, Bow Valley College, NorQuest College, industry and aboriginal organizations will help more than 600 aboriginal people train for careers in the construction industry.

The Alberta Aboriginal Construction Career Centres pilot will complement other existing programs that support aboriginal training and employment in trades careers.

Bow Valley College in Calgary and NorQuest College in Edmonton will each host a new Alberta Aboriginal Construction Career Centre program on their main campuses. Under the program, the two centres will deliver employment training, job coaching and counselling to more than 300 aboriginal people at each institution, with a focus on construction trades. Over its two-year duration, the program aims to provide construction-related job placements for up to 300 registrants.

"This program is the result of our partners identifying and acting on an opportunity that will have an impact on generations to come," says Alberta Premier Jim Prentice. "In an industry that is critical to the growth of our province, these career centres are opening doors of opportunity for aboriginal people and answering the industry's need for skilled workers."

Jodi L. Abbott, president and chief executive officer of NorQuest College, says "Bow Valley and NorQuest Colleges are committed to a respectful and collaborative partnership with urban and rural aboriginal communities. The purpose of the program is to contribute to existing community resources that are targeting successful employment outcomes in the construction industry."

The Alberta government is contributing $1 million to the project, with an additional $525,000 from the two colleges and $750,000 from industry and aboriginal stakeholders. ■

PHOTO: ISTOCKPHOTO

WHAT'S NEW IN THE OIL SANDS

BUSINESS

The Canadian Association of Petroleum Producers (CAPP) says that the long-term need for Canada to diversify its oil and gas markets and build infrastructure to move these products to market remains strong despite the recent sharp oil price decline and cuts in capital spending intentions.

According to the review, capital investment in western Canada, including the oil sands, will total $46 billion in 2015, down 33 per cent from $69 billion invested in 2014. In the oil sands, 2015 capital investment is forecast at $25 billion compared to $33 billion last year. If pricing declines continue, CAPP anticipates further revisions could occur."

Suncor Energy says costs are falling at the $15-billion Fort Hills oil sands mine as a result of the recent downturn in project spending across the industry. Fort Hills is currently under construction with expected start-up in late 2017.

Suncor president and chief executive officer Steve Williams says that the project is experiencing deflation thanks to lower fuel costs and better productivity from a higher-quality workforce that lives nearby, cutting down on the need to fly workers in from long distances.

Husky Energy has commenced steam operations at the Sunrise SAGD project. Located adjacent to Suncor's Firebag SAGD project north of Fort McMurray, the 60,000-bbl/d project is being developed with two central processing facilities.

The first 30,000-bbl/d plant, estimated to cost $3.2 billion, is expected to begin production toward the end of the first quarter of 2015. The second 30,000-bbl/d plant is expected to begin steaming mid-year, with output commencing a few months later. Volumes are expected to ramp up to full capacity over a two-year period.

Pengrowth Energy says it has commenced steam operations at the 12,500-bbl/d Lindbergh SAGD project in the Cold Lake region.

Pengrowth has been operating a two-well-pair pilot at Lindbergh for the last 34 months, which has produced approximately 1.6 million barrels to date with a cumulative steam to oil ratio of 2.1:1. November production from the pilot averaged approximately 1,760 bbls/d with an instantaneous steam to oil ratio of 2.3:1.

CNOOC says that bitumen production has begun at its Kinosis 1A SAGD project south of Fort McMurray. The company says that bitumen produced from Kinosis Phase 1A will be processed at its Long Lake upgrader, which is about 12 kilometres away.

Kinosis 1A is designed to produce 20,000 bbls/d of bitumen and is expected to play a "significant role" in filling the Long Lake plant, CNOOC says. The upgrader has synthetic crude oil output capacity of approximately 60,000 bbls/d but has long been stuck at about 40,000 bbls/d.

Syncrude has applied to the Alberta Energy Regulator for the Mildred Lake Extension project, which will enable sustained bitumen production in two additional nearby areas once the currently approved areas have been depleted.

If approved, pre-production capital expenditures are estimated at $3 billion over the nine-year construction phase, from 2018 to 2026, for both the east and west pits.

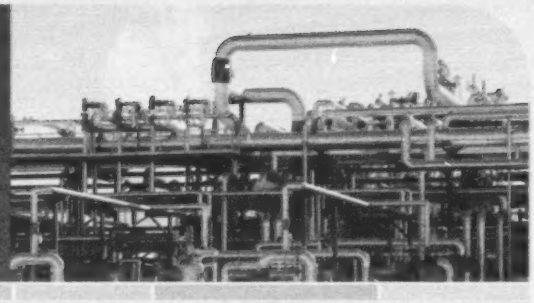
Imperial Oil says that its two current oil sands expansion projects, Kearl Phase 2 and the Nabiye thermal expansion at Cold Lake, are essentially complete, adding 150,000 bbls/d of bitumen production capacity to the company's assets.

The European Union's new fuel quality directive will treat Canada's oil sands production the same as other sources of oil from around the world, creating new export opportunities for energy and allowing Canada to compete more freely in the global market, CAPP says.

"This is an important signal for Canada as it means our oil will not face discrimination in Europe," says Tim McMillan, CAPP president and chief executive officer. "It also opens the door further for Canadian companies to compete on a level playing field for new markets in Europe and abroad." ■

WHAT'S NEW IN THE OIL SANDS

TECHNOLOGY



Syncrude's $3.9-billion Mildred Lake Mine Replacement (MLMR) project is now operating, and the company says its new wet crushing technology is showing early signs of success. Syncrude says wet crushing is the heart of the MLMR project, which started delivering its first oil sands slurry to extraction in October. Wet crushing is designed to reduce the volume of rejects in the extraction process and improve recovery rates of bitumen mined from the oil sands.

The 13 member companies of Canada's Oil Sands Innovation Alliance (COSIA) have announced their first concrete performance target: to reduce in situ freshwater use intensity by 50 per cent by 2022. The target, announced at COSIA's second annual performance update, would see its members use 0.2 barrels of fresh water for every barrel of bitumen produced instead of 0.4 barrels.

John Brogly, COSIA's director for the water environmental priority area (EPA), says this will be achieved through a combination of switching from freshwater sources to brackish water sources and improving water treatment.

"[Brackish] is not the easiest process water to deal with," Brogly says. "There isn't a silver bullet, but there are a whole series of potential technologies that are very, very promising, particularly in the water area, that are going to help deliver that goal."

COSIA reports that it started 68 new projects across its four EPAs in 2014 that cost over $200 million, contributing to an active portfolio of some 238 projects. All in, the group says its members are sharing more than 777 technologies at a cost of $950 million.

The new projects include:

- Water EPA—Demonstration pit lakes project
  Lead: Shell

A demonstration-scale pit lakes research facility on an operating oil sands mine site. In 2014, funding was secured to examine business models, long-term funding, alignment with regulators, site selection and engineering. Operations are expected to begin in 2017.

- Tailings EPA—Saskatchewan Research Council laminar flow
  Lead: Canadian Natural Resources

New thickened tailings technologies are great for reducing water consumption and tailings storage needs, but they're proving challenging for the pipelines that still need to transport the material across oil sands sites. COSIA has engaged the Saskatchewan Research Council to develop a reliable model to determine the conditions required to successfully operate large-diameter slurry pipelines in laminar flow (linear flow with no mixing between layers).

- Greenhouse gas EPA—Satellite monitoring of area fugitive emissions
  Lead: Imperial Oil

This project, which is pending sign-off, would investigate the use of satellites to provide accurate measurements of greenhouse gas (GHG) emissions from tailings ponds and mine faces. The project, a partnership with GHGSat, has funding from Sustainable Development Technology Canada, Boeing and LOOKNorth. COSIA says the existing measurement method has a high degree of uncertainty (20–50 per cent), high costs and high safety risks.

COSIA also used its performance update to announce its challenges or areas where there is need for innovation. The challenges are purposefully vague in order to not limit potential solutions, the group says.

On the GHG file, these include:

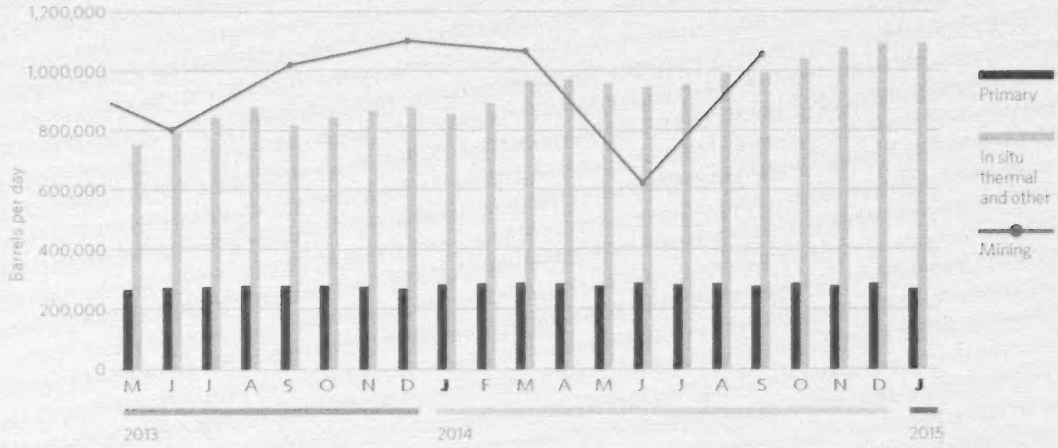
- Downhole steam generation;
- Enriched gas combustion air;
- Natural gas decarbonization;
- Water and energy recovery;
- New heat exchanger; and
- Pressure letdown.

Under the water file, these include:

- Fouling-resistant once-through steam generators;
- Fouling-resistant heat exchanger tubes;
- High-temperature membrane separation; and
- Alternative silica removal technologies.

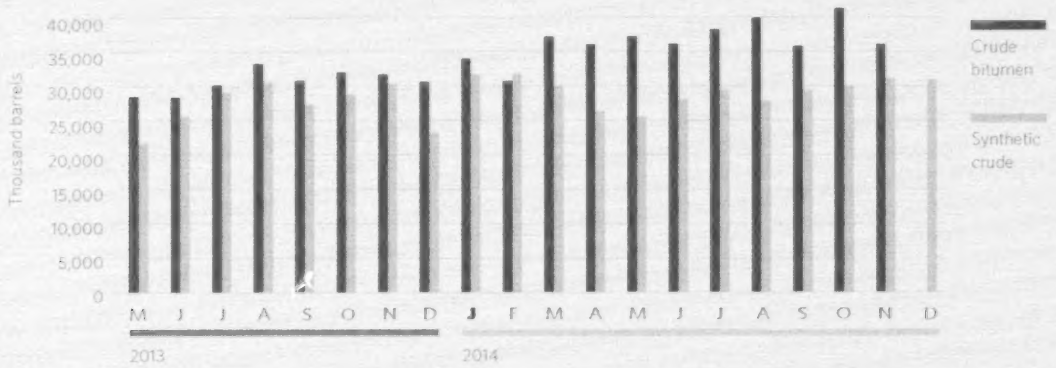
OIL SANDS PRODUCTION DATA

Alberta oil sands production by extraction method



SOURCE: ALBERTA ENERGY REGULATOR

Alberta crude bitumen and synthetic crude production



SOURCE: ALBERTA ENERGY REGULATOR

OIL SANDS TECHNOLOGY LEGEND See oil sands project status listing on page 10.

ADC USP (Upgrading) Accelerated decontamination, ultra-selective pyrolysis

AIRINJ Air injection

BEST Bitumen extraction solvent technology

C & SC Cyclic and solvent cyclic

C-SAGD Cyclic steam assisted gravity drainage

CSS Cyclic steam stimulation

ET-DSP Electro-thermal dynamic stripping

HCSS Horizontal cyclic steam stimulation

HTL Heavy-to-light upgrading process

In situ Production technology undisclosed; will use drilling and enhanced recovery

LP-SAGD Low-pressure steam assisted gravity drainage

Mining Truck and shovel mining

Orcrude Primary upgrading process

SAGD Steam assisted gravity drainage

SAP Solvent aided process

SC-SAGD Solvent cyclic steam assisted gravity drainage

TAGD Thermal assisted gravity drainage

THAI Toe to heel air injection

UPG Bitumen upgrading

VSD Vertical steam drive

PROJECT LISTINGS see oil sands project technology legend on page 9

Updated status of oil sands projects in Alberta | As of March 2015

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION — MINING				
Canadian Natural Resources Limited				
Horizon				
Canadian Natural has significantly reduced capital spending on its in situ projects in 2015 but says that the phase 2 and 3 expansions at Horizon remain on track. A major turnaround is scheduled for the third quarter.				
Phase 1	135,000	2008	OP	Mining
Reliability - Tranche 2	5,000	2014	OP	Mining
Phase 2A	12,000	2014	OP	Mining
Phase 2B	45,000	2016	UC	Mining
Phase 3	80,000	2017	UC	Mining
Imperial Oil Limited				
Kearl				
Imperial says that excluding the precautionary shutdown at Kearl in November due to excessive vibration in the ore crusher unit, quarterly production averaged 87,000 bbls/d. The company says that its Kearl expansion project is essentially complete. Start-up is now slated for the third quarter of 2015 versus the original year-end target.				
Phase 1	110,000	2013	OP	Mining
Phase 2	110,000	2015	UC	Mining
Phase 3	80,000	2020	Approved	Mining
Phase 4 Debottlenecking	45,000	TBD	Approved	Mining
Shell Albian Sands				
Jackpine				
Phase 1A	100,000	2010	OP	Mining
Phase 1B	100,000	TBD	Approved	Mining
Expansion	100,000	2017	Approved	Mining
Muskeg River				
Marathon Oil says that a decrease in income for the Athabasca Oil Sands Project in the fourth quarter of 2014 was partially offset by higher net sales volumes.				
Commercial	155,000	2002	OP	Mining
Expansion & Debottlenecking	115,000	TBD	Approved	Mining
Pierre River				
Shell has withdrawn its application for the Pierre River project, saying it wants to focus on its existing oilsands operations. The company says it will continue to hold the Pierre River leases and may re-apply in the future.				
Phase 1	100,000	TBD	CAN	Mining
Phase 2	100,000	TBD	CAN	Mining
Suncor Energy Inc.				
Base Operations				
Suncor says that oilsands production volumes decreased in the fourth quarter of 2014 compared to the prior year's quarter, primarily due to unplanned maintenance at Upgrader 2. During the quarter, Suncor also completed planned coker maintenance at Upgrader 1.				
Millennium Mine	294,000	1967	OP	Mining
Steepbank Debottlenecking Phase 3	4,000	2007	OP	Mining
Millennium Debottlenecking	23,000	2008	OP	Mining
North Steepbank Extension	180,000	2012	OP	Mining
Fort Hills				
Suncor says that during the fourth quarter it continued well-pad development associated with the MacKay River facility debottlenecking project.				
Phase 1	160,000	2017	UC	Mining
Debottlenecking	20,000	TBD	Approved	Mining
Voyageur South				
Suncor considers Voyageur South to be a longer-term project and has not confirmed a start-up date.				
Phase 1	120,000	TBD	APPL	Mining
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
Syncrude has filed the regulatory application for the MLX project.				
Base Mine Stage 1 and 2 Expansion	290,700	1978	OP	Mining
Stage 3 Expansion	116,300	2006	OP	Mining
Centrifuge Tailings Management	TBD	TBD	UC	Mining
Aurora SouthTrain 1	100,000	TBD	Approved	Mining
Aurora SouthTrain 2	100,000	TBD	Approved	Mining
Mildred Lake Mine Extension (MLX)	184,000	2023	APPL	Mining
Teck Resources Limited				
Frontier				
Teck says that the regulatory review process for the Frontier project is expected to continue into 2015, making late 2015 or 2016 the earliest an approval decision and receipt of required permits is expected.				
Phase 1	74,600	2021	APPL	Mining
Phase 2	84,000	2024	APPL	Mining
Phase 3	79,300	2027	APPL	Mining
Phase 4 Equinox	39,400	2030	APPL	Mining
Total E&P Canada Ltd.				
Joslyn North Mine				
Total has announced it will delay the Joslyn Mine while project owners seek ways to reduce costs.				
Phase 1	100,000	TBD	HOLD	Mining
NORTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Birch				
Athabasca lists Birch as one of its long-term assets.				
Phase 1	12,000	TBD	ANN	SAGD
Dover West Carbonates (Leduc)				
Athabasca lists Dover West as one of its long-term assets.				
Phase 1 Demonstration	6,000	2016	Approved	SAGD
Phase 2 Demonstration	6,000	TBD	APPL	SAGD
Dover West Sands & Clastics				
Athabasca lists Dover West as one of its long-term assets.				
Phase 1	12,000	TBD	APPL	SAGD
Phase 2	35,000	2019	ANN	SAGD
Phase 3	35,000	2020	ANN	SAGD
Phase 4	35,000	2022	ANN	SAGD
Phase 5	35,000	2024	ANN	SAGD
BP p.l.c.				
Terre de Grace				
BP says that ongoing appraisal activities continue.				
Pilot	10,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Brion Energy Corporation				
Dover				
Dover Experimental Pilot	2,000	2017	Approved	SAGD
Dover North Phase 1	50,000	TBD	Approved	SAGD
Dover North Phase 2	50,000	TBD	Approved	SAGD
Dover South Phase 3	50,000	2021	Approved	SAGD
Dover South Phase 4	50,000	2023	Approved	SAGD
Dover South Phase 5	50,000	2025	Approved	SAGD
MacKay River				
Phase 1	35,000	2015	UC	SAGD
Phase 2	40,000	2018	Approved	SAGD
Phase 3	40,000	2020	Approved	SAGD
Phase 4	35,000	2022	Approved	SAGD
Canadian Natural Resources Limited				
Birch Mountain				
Canadian Natural says Birch is in the planning stages.				
Phase 1	60,000	2019	ANN	SAGD
Phase 2	60,000	2023	ANN	SAGD
Cenovus Energy Inc.				
East McMurray				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	ANN	SAGD
Steepbank				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	ANN	SAGD
Telephone Lake				
Cenovus will significantly reduce spending at its emerging oilsands assets, including Telephone Lake, in 2015. The company expects to make a decision on the timing of development in 2015.				
Phase A	45,000	TBD	Approved	SAGD
Phase B	45,000	TBD	Approved	SAGD
E-T Energy Ltd.				
Poplar Creek				
E-T Energy has engaged Sayer Advisors to dispose of its oilsands leases. The company is refocusing both its time and capital on the development of its technology.				
Experimental Pilot	1,000	2012	SUSP	SAGD
Phase 1	10,000	TBD	HOLD	SAGD
Phase 2	40,000	TBD	HOLD	SAGD
Grizzly Oil Sands Ulc				
Thickwood				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oilsands projects in the new shallow thermal area of the Athabasca region until it has developed formal regulatory requirements. Grizzly Thickwood is one of five impacted projects.				
Phase 1	6,000	TBD	APPL	SC-SAGD
Phase 2	6,000	TBD	APPL	SC-SAGD
Husky Energy Inc.				
Saleski				
Husky filed the regulatory application for its Saleski pilot in early May 2013.				
Carbonate Pilot	3,000	2017	APPL	SC-SAGD
Sunrise				
Husky has commenced steaming at the Sunrise project and expects production to begin before the end of the first quarter.				
Phase 1A	30,000	2015	OP	SAGD
Phase 1B	30,000	2015	UC	SAGD
Phase 2A	35,000	TBD	Approved	SAGD
Phase 2B	35,000	TBD	Approved	SAGD
Future Phases	70,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Imperial Oil Limited				
Aspen				
Alberta has issued the final terms of reference for Imperial's Aspen project.				
Phase 1	45,000	2020	APPL	SAGD
Phase 2	45,000	TBD	APPL	SAGD
Phase 3	45,000	TBD	APPL	SAGD
Ivanhoe Energy Inc.				
Tamarack				
Ivanhoe Energy says that it is in ongoing discussions with various stakeholders to recapitalize the company.				
Phase 1	20,000	TBD	APPL	SAGD
Phase 2	20,000	TBD	APPL	SAGD
Koch Exploration Canada Corporation				
Dunkirk				
Koch has filed the regulatory application for the proposed Dunkirk SAGD project.				
Commercial Demonstration	2,000	2017	APPL	SAGD
Phase 1	30,000	2018	ANN	SAGD
Phase 2	30,000	TBD	ANN	SAGD
Marathon Oil Corporation				
Birchwood				
Marathon had anticipated receiving regulatory approval for the Birchwood project by the end of 2014. Upon receiving this approval, the company will further evaluate its development plans.				
Demonstration	12,000	2017	APPL	SAGD
Oak Point Energy Ltd.				
Lewis				
Pilot	1,720	TBD	Approved	SAGD
Prosper Petroleum Ltd.				
Rigel				
Prosper Petroleum filed its regulatory application for the Rigel SAGD project in November 2013.				
Phase 1	10,000	2017	APPL	SAGD
SilverWillow Energy Corporation				
Audet				
SilverWillow says its strategic process is still in progress, and it continues to engage with industry participants and investors who are active in the sector. The company is also active in the industry consultation process with the Alberta Energy Regulator regarding new rules for shallow SAGD projects, it is optimistic that there will be a favourable outcome for the shallow SAGD sector, but the timing and content of the new rules is still undefined.				
Pilot	12,000	2018	APPL	SAGD
Southern Pacific Resource Corp.				
STP-McKay				
Southern Pacific and certain of its subsidiaries have obtained creditor protection under the Companies' Creditors Arrangement Act.				
Phase 1	12,000	2012	OP	SAGD
Phase 1 Expansion	6,000	2016	APPL	SAGD
Phase 2A	12,000	2018	APPL	SAGD
Phase 2B	6,000	2018	APPL	SAGD
Suncor Energy Inc.				
Dover				
N-Solv Corporation says it has reached the milestone of 25,000 barrels of bitumen produced at its Dover pilot since start-up in spring 2014.				
Demonstration Plant	500	2014	OP	SAGD
Firebag				
Suncor says that it achieved record production at Firebag during the fourth quarter, with volumes exceeding plant nameplate capacity of 180,000 bbls/d.				
Stage 1	35,000	2004	OP	SAGD
Stage 2	35,000	2006	OP	SAGD
Cogeneration and Expansion	25,000	2007	OP	SAGD
Stage 3	42,500	2011	OP	SAGD
Stage 4	42,500	2012	OP	SAGD
Stage 5	62,500	2018	Approved	SAGD
Stage 6	62,500	2019	Approved	SAGD
Stage 3-6 Debottlenecking	23,000	TBD	APPL	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Lewis				
Phase 1	40,000	TBD	ANN	IN SITU
Phase 2	40,000	TBD	ANN	IN SITU
MacKay River				
Suncor has announced it will defer sanction of the MacKay River expansion project.				
Phase 1	33,000	2002	OP	SAGD
Debottlenecking	5,000	2014	OP	SAGD
MR2	20,000	TBD	Approved	SAGD
Sunshine Oilsands Ltd.				
Legend Lake				
Phase A1	10,000	2016	APPL	SAGD
Phase A2	30,000	TBD	ANN	SAGD
Phase B1	30,000	TBD	ANN	SAGD
Phase B2	30,000	TBD	ANN	SAGD
Thickwood				
Alberta has issued the final terms of reference for Sunshine's Thickwood expansion project.				
Phase A1	10,000	TBD	Approved	SAGD
Phase A2	30,000	2017	ANN	SAGD
Phase B	30,000	2021	ANN	SAGD
West Ells				
Sunshine Oilsands says it is on track for first steam at the end of the first quarter of 2015 and for first production in the third quarter of 2015. The company says it is firmly focused on ensuring success of the approved phases of West Ells.				
Phase A1	5,000	2015	UC	SAGD
Phase A2	5,000	TBD	Approved	SAGD
Phase A3	30,000	TBD	ANN	SAGD
Phase B	20,000	TBD	ANN	SAGD
Phase C1	30,000	TBD	ANN	SAGD
Phase C2	30,000	TBD	ANN	SAGD
SOUTH ATHABASCA REGION — IN SITU				
Athabasca Oil Corporation				
Hangingstone				
Athabasca says it continues to expect first steam at Hangingstone Phase 1 at the end of the first quarter of 2015.				
HS-1	12,000	2015	UC	SAGD
HS-2A Debottlenecking (1 and 2)	8,000	2017	APPL	SAGD
HS-2B Expansion	32,000	2019	APPL	SAGD
HS-3	30,000	2021	APPL	SAGD
BlackPearl Resources Inc.				
Blackrod				
BlackPearl says the BlackRod pilot continued to achieve positive results in 2014, with the second well pair achieving production rates of 400 bbls/d during the fourth quarter with a steam to oil ratio near 3:1, while the well was still in its ramp-up phase. Regulatory approval for the 80,000-bbl/d commercial project is expected this spring.				
Pilot	800	2011	OP	SAGD
Phase 1	20,000	TBD	APPL	SAGD
Phase 2	30,000	2018	APPL	SAGD
Phase 3	30,000	2021	APPL	SAGD
Canadian Natural Resources Limited				
Gregoire Lake				
Canadian Natural says Gregoire Lake is in the planning stages.				
Phase 1	60,000	TBD	ANN	SAGD
Phase 2	60,000	TBD	ANN	SAGD
Grouse				
Commercial	40,000	2020	APPL	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Kirby				
Canadian Natural plans to drill three new producer wells at Kirby in 2015. The company says it will defer spending on Kirby North Phase 1 until oil prices improve.				
KS1 - Kirby South	40,000	2013	OP	SAGD
KN1 - Kirby North	40,000	2017	HOLD	SAGD
KN2 - Kirby North	60,000	2022	Approved	SAGD
Cavalier Energy Inc.				
Hoole				
Regulatory approval for the first phase of the Hoole project was granted in June 2014. Development of this phase is dependent upon Cavalier Energy securing financing and sanctioning by its board of directors. In July 2014, Cavalier acquired approximately 23 net sections of undeveloped land contiguous with its Hoole lands for $20 million.				
Phase 1	10,000	2017	Approved	SAGD
Phase 2A	35,000	TBD	ANN	SAGD
Phase 2B	35,000	TBD	ANN	SAGD
Cenovus Energy Inc.				
Christina Lake				
In 2015 Cenovus plans to invest between $800 million and $860 million at Christina Lake.				
Phase 1A	10,000	2002	OP	SAGD
Phase 1B	8,800	2008	OP	SAGD
Phase C	40,000	2011	OP	SAGD
Phase D	40,000	2012	OP	SAGD
Phase E	40,000	2013	OP	SAGD
Optimization (Phases C,D,E)	22,000	2015	UC	SAGD
Phase F	50,000	2016	UC	SAGD
Phase G	50,000	2017	Approved	SAGD
Phase H	50,000	TBD	APPL	SAGD
Foster Creek				
Cenovus says in response to the current low price environment, it will be spreading capital investment over a longer period of time. In 2015 the company plans to spend between $700 million and $750 million at Foster Creek, pushing out first production from phases G and H-out by one or two quarters.				
Phase A	24,000	2001	OP	SAGD
Phase B Debottlenecking	6,000	2003	OP	SAGD
Phase C Stage 1	10,000	2005	OP	SAGD
Phase C Stage 2	20,000	2007	OP	SAGD
Phase D	30,000	2009	OP	SAGD
Phase E	30,000	2009	OP	SAGD
Phase F	30,000	2014	OP	SAGD
Phase G	30,000	2016	UC	SAGD
Phase H	30,000	2017	UC	SAGD
Future Optimization (Phases F,G,H)	35,000	TBD	ANN	SAGD
Phase J	50,000	TBD	APPL	SAGD
Future Optimization	15,000	TBD	ANN	SAGD
Grand Rapids				
Cenovus says it will reduce spending at its emerging oilsands assets in 2015, including Grand Rapids. The company does plan to drill a third well pair at the operating pilot in the first quarter, and says data from these well pairs will help determine the future pace of its Grand Rapids development.				
Pelican Lake Pilot	600	2011	OP	SAGD
Pelican Upper Grand Rapids Phase A	10,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase B	32,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase C	29,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase D	29,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase E	32,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase F	29,000	TBD	Approved	SAGD
Pelican Upper Grand Rapids Phase G	19,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Narrows Lake				
Cenovus says it will substantially slow development of the Narrows Lake project in order to help preserve cash and focus on value creation. The company will spend between $60 million and $75 million at Narrows Lake in 2015.				
Phase A	45,000	TBD	UC	SAP
Phase B	45,000	TBD	Approved	SAP
Phase C	40,000	TBD	Approved	SAP
West Kirby				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	ANN	SAGD
Winefred Lake				
Cenovus says this project remains part of its portfolio of long-term development opportunities.				
Phase 1	30,000	TBD	ANN	SAGD
CNOOC Limited				
Long Lake				
CNOOC says that first oil from Kinosis 1A has been achieved.				
Phase 1	72,000	2008	OP	SAGD
Kinosis (K1A)	20,000	2014	OP	SAGD
Kinosis (K1B)	40,000	TBD	Approved	SAGD
Connacher Oil And Gas Limited				
Great Divide				
Connacher has announced a recapitalization plan and reduced capital budget for 2015 that contemplates halting work on both its mini-steam expansion and SAGD+ technology commercialization.				
Pod One	10,000	2007	OP	SAGD
Algar	10,000	2010	OP	SAGD
Expansion 1A	12,000	TBD	Approved	SAGD
Expansion 1B	12,000	TBD	Approved	SAGD
ConocoPhillips				
Surmont				
ConocoPhillips says that a major turnaround was completed at Surmont 1 during the third quarter and that Surmont 2 remains on track for first steam in mid-2015.				
Pilot	1,200	1997	OP	SAGD
Phase 1	30,000	2007	OP	SAGD
Phase 2	118,000	2015	UC	SAGD
Phase 3 - Tranche 1	45,000	2020	APPL	SAGD
Phase 3 - Tranche 2	45,000	2021	APPL	SAGD
Phase 3 - Tranche 3	45,000	2023	APPL	SAGD
Devon Canada Corporation				
Jackfish				
Devon says that ramp-up at Jackfish 3 is exceeding expectations.				
Phase 1	35,000	2007	OP	SAGD
Phase 2	35,000	2011	OP	SAGD
Phase 3	35,000	2014	OP	SAGD
Jackfish East				
Expansion	20,000	2018	ANN	SAGD
Pike				
Devon says that it will conduct additional engineering work on Pike throughout 2015 in order to properly scope out the project and its costs. The company expects to see significant cost savings as it moves toward a go-ahead decision.				
1A	35,000	2016	Approved	SAGD
1B	35,000	2017	Approved	SAGD
1C	35,000	2018	Approved	SAGD
Grizzly Oil Sands Ulc				
Algar Lake				
Grizzly part-owner Gulfport Energy Corporation says that production at Algar Lake was lower than anticipated during the fourth quarter due to a steam-plant turnaround requiring more time than expected. Grizzly anticipates the operating project to reach peak production in the fourth quarter of 2015.				
Phase 1	6,000	2014	OP	SAGD
Phase 2	6,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
May River				
Grizzly filed the regulatory application for May River phases 1 and 2 in December 2012. The company plans to file the regulatory application for a 90,000-bbl/d full field development by December 2016.				
Phase 1	6,000	2016	APPL	SAGD
Phase 2	6,000	TBD	APPL	SAGD
Harvest Operations Corp.				
BlackGold				
Harvest says that at Sept. 30, 2014, Phase 1 of the BlackGold project was approximately 97 per cent complete. Phase 1 completion, commissioning of the CPF and first steam are expected in the first quarter of 2015.				
Phase 1	10,000	2015	OP	SAGD
Phase 2	20,000	TBD	Approved	SAGD
Japan Canada Oil Sands Limited				
Hangingstone				
The Hangingstone expansion will receive its diluent from Inter Pipeline's Polaris Pipeline. Additionally, Aquatech has been awarded a contract to provide its evaporator technology for OSTG blowdown treatment.				
Expansion	20,000	2016	UC	SAGD
Hangingstone Pilot				
Pilot	11,000	1999	OP	SAGD
Koch Exploration Canada Corporation				
Muskwa				
Regulatory approval granted in June 2014.				
Pilot	10,000	TBD	Approved	SAGD
Laricina Energy Ltd.				
Germain				
Laricina has suspended operations at the Germain SAGD project in order to reduce capital and operating costs as it continues its financial and strategic alternatives.				
Phase 1 CDP	5,000	2013	SUSP	SC-SAGD
Phase 2	30,000	2018	APPL	SC-SAGD
Phase 3	60,000	TBD	APPL	SC-SAGD
Phase 4	60,000	TBD	APPL	SC-SAGD
Saleski				
Laricina says that while the Saleski pilot continues to operate, it has suspended development activities on future phases as the company and its partner continue to evaluate available financing alternatives and opportunities within a minimized capital spending program.				
Experimental Pilot	1,800	2011	OP	Cyclic and SC-SAGD
Phase 1	10,700	TBD	Approved	Cyclic SAGD
Phase 2	30,000	TBD	HOLD	IN SITU
Phase 3	60,000	TBD	ANN	IN SITU
Phase 4	60,000	2023	ANN	IN SITU
Phase 5	60,000	2026	ANN	IN SITU
Phase 6	60,000	TBD	ANN	IN SITU
MEG Energy Corp.				
Christina Lake				
Despite significantly cutting its capital budget, MEG continues to target a production increase to up to 82,000 bbls/d from the Christina Lake project in 2015. The company is considering a series of brownfield expansions of Phase 2B.				
Phase 1 Pilot	3,000	2008	OP	SAGD
Phase 2A	22,000	2009	OP	SAGD
Phase 2B	55,000	2013	OP	SAGD
Phase 3A	50,000	TBD	Approved	SAGD
Phase 3B	50,000	2018	Approved	SAGD
Phase 3C	50,000	2020	Approved	SAGD
Surmont				
The environmental assessment director has deemed the environmental impact assessment report complete for MEG Energy's Surmont project.				
Phase 1	40,000	TBD	APPL	SAGD
Phase 2	40,000	TBD	APPL	SAGD
Phase 3	40,000	TBD	APPL	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Osum Oil Sands Corp.				
Sepiko Kesik				
Osum says it anticipates regulatory approval for Sepiko Kesik in 2015.				
Phase 1	30,000	2018	APPL	CSS SAGD
Phase 2	30,000	2020	APPL	CSS SAGD
PTT Exploration and Production				
Mariana - Hangingstone				
PTTEP says that the sudden drop in oil prices has forced it to re-assess asset values of the Mariana SAGD project as well as the PTTEP Australasia project, resulting in one-time impairment losses of US$997 for both projects. The company says that winter delineation drilling is underway for the Mariana project.				
Phase 1	20,000	TBD	HOLD	SAGD
Mariana - South Leismer				
Phase 1	20,000	TBD	HOLD	SAGD
Mariana - Thornbury				
PTTEP says that pre-FEED activities, as well as studying development options for Thornbury Phase 1, have moved ahead.				
Phase 1	40,000	TBD	Approved	SAGD
Expansion	20,000	TBD	HOLD	SAGD
Renergy Petroleum (Canada) Co., Ltd.				
Muskwa				
Renergy Petroleum, an affiliate of Changjiang Investment Group, has applied to construct and operate a one-year pilot project on an existing wellsite that would test a proprietary steam and CO_2 regeneration and co-injection scheme.				
Muskwa Experimental Pilot	TBD	2015	APPL	Steam co-injection
Statoil				
Corner				
Statoil says it will delay the Corner project for at least three years, citing rising costs and market access issues.				
Phase 1	40,000	TBD	HOLD	SAGD
Leismer				
Demonstration	10,000	2010	OP	SAGD
Commercial	10,000	2011	OP	SAGD
Expansion	20,000	TBD	Approved	SAGD
Northwest	20,000	TBD	Disclosed	SAGD
Suncor Energy Inc.				
Chard				
Phase 1	40,000	TBD	ANN	IN SITU
Meadow Creek East				
Phase 1	20,000	2020	Approved	SAGD
Phase 2	30,000	2022	Approved	SAGD
Phase 3	30,000	TBD	Approved	SAGD
Surmont Energy Ltd.				
Wildwood				
The Wildwood project is waiting on Alberta Energy Regulator approval. Surmont says that financing is not currently in place, but there are several interested parties in Asia and domestically for either a joint venture or straight investment.				
Phase 1	12,000	TBD	APPL	SAGD
Value Creation Inc.				
Advanced TriStar				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oilsands projects in the new shallow thermal area of the Athabasca region until it has developed formal regulatory requirements. Advanced TriStar is one of five impacted projects.				
ATS-1	15,000	2016	APPL	SAGD
ATS-2	30,000	2018	APPL	SAGD
ATS-3	30,000	2020	APPL	SAGD
TriStar				
Value Creation says it is funded for the TriStar project but has not yet decided on a construction timeline.				
Pilot	1,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
COLD LAKE REGION — IN SITU				
Baytex Energy Corp.				
Gemini				
Baytex planned to file a regulatory amendment for a 5,000-bbl/d SAGD project (versus the approved 10,000-bbl/d SAGD project) in the fourth quarter of 2014. The amendment will include additional delineated lands as well as capture various facility modifications. While this regulatory step is necessary to progress the project, Baytex says that a final investment decision is contingent upon a full economic review and the outcome of the front-end engineering study, which is currently in progress.				
Pilot	1,200	2014	OP	SAGD
Commercial	5,000	2017	Approved	SAGD
Birchwood Resources Inc.				
Sage				
Birchwood Resources has engaged Sayer Energy Advisors in a strategic review process.				
Pilot	5,000	TBD	APPL	Low pressure SAGD
Canadian Natural Resources Limited				
Primrose & Wolf Lake				
Canadian Natural says its stepwise plan to return to steaming operations at Primrose with enhanced mitigation strategies in place has progressed. A low-pressure steamflood is now operating at Primrose East Area 1 and is performing as expected. Primrose South received approval for additional CSS on four pads in September 2014; production is targeted to ramp up in 2015. Additionally, during the third quarter of 2014, an application for low pressure CSS was submitted to the Alberta Energy Regulator for Primrose East Area 2. The company does not plan to drill any new production wells at Primrose in 2015.				
Wolf Lake	13,000	1985	OP	CSS
Primrose South	45,000	1985	OP	CSS
Primrose North	30,000	2006	OP	CSS
Primrose East	37,000	2008	OP	CSS
Devon Canada Corporation				
Walleye				
Devon says the Walleye project is currently on hold.				
Phase 1	9,000	2016	APPL	SAGD
Husky Energy Inc.				
Caribou				
Demonstration	10,000	TBD	Approved	SAGD
Tucker				
Maintenance turnaround planned for the third quarter of 2015.				
Phase 1	30,000	2006	OP	SAGD
Imperial Oil Limited				
Cold Lake				
Imperial says that steam injection at the Nabiye expansion project began in January. Bitumen production is targeted in the first quarter.				
Phase 1-10	110,000	1985	OP	CSS
Phase 11-13	30,000	2002	OP	CSS
Experimental SA-SAGD	TBD	2013	OP	SA-SAGD
Phase 14-16	40,000	2016	OP	CSS
Osum Oil Sands Corp.				
Orion				
Osum says that operational improvements to progressively increase production to 10,000 bbl/d will be pursued in 2014-16 and funded through cash flow.				
Phase 1	10,000	2007	OP	SAGD
Phase 2	10,000	TBD	Approved	SAGD
Taiga				
Osum says that Taiga Phase 1 will be advanced in 2015-16 subject to financing.				
Phase 1	12,500	TBD	Approved	CSS & SAGD
Phase 2	12,500	TBD	Approved	CSS & SAGD
Phase 3	20,000	TBD	Approved	CSS & SAGD

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Pengrowth Energy Corporation				
Lindbergh				
Penprowth has revised its development plan for the Lindbergh project into two optimized phases versus the originally planned three. The company expects overall capital cost savings of about $800 million using the new approach.				
Pilot	1,260	2012	OP	SAGD
Phase 1	11,240	2015	OP	SAGD
Phase 1 Optimization	3,500	TBD	UC	SAGD
Phase 2 Expansion	34,000	2017	APPL	SAGD
PEACE RIVER REGION — IN SITU				
Andora Energy Corporation				
Sawn Lake				
Andora majority owner Pan Orient Energy says that early stage production numbers compare favourably to an analogous reservoir in a demonstration project operated by another company of similar reservoir type that is being monitored as a basis of comparison.				
Demonstration	1,400	2014	OP	SAGD
Baytex Energy Corp.				
Cliffdale				
Pilot	2,000	2011	OP	CSS
Harmon Valley				
Pilot	TBD	2011	OP	CSS
Murphy Oil Company Ltd.				
Seal/Cadotte				
Pilot	TBD	TBD	OP	CSS
Northern Alberta Oil Ltd.				
Sawn Lake				
Pilot	700	TBD	Approved	Horizontal CSS
Penn West Petroleum Ltd.				
Harmon Valley South				
Pilot	TBD	2014	OP	Horizontal CSS
Seal Main				
Pilot	75	2011	OP	Horizontal CSS
Commercial	10,000	TBD	APPL	Horizontal CSS
Royal Dutch Shell plc				
Peace River				
Shell says it will delay investment in the third phase of the Carmon Creek project.				
Cadotte Lake	12,500	1986	OP	CSS
Carmon Creek - Phase 1	40,000	2017	UC	VSD
Carmon Creek - Phase 2	40,000	2018	Approved	VSD
Touchstone Exploration Inc.				
Dawson				
Experimental Demonstration	TBD	2014	OP	CSS
Phase 2	10,000	TBD	ANN	CSS
NORTH ATHABASCA REGION — UPGRADER				
BP p.l.c.				
Terre de Grace				
BP says that ongoing appraisal activities continue.				
Pilot	8,400	TBD	Approved	UPG
Canadian Natural Resources Limited				
Horizon				
Canadian Natural has significantly reduced capital spending on its in situ projects in 2015, but says that the phase 2 and 3 expansions at Horizon remain on track. A major turnaround is scheduled for the third quarter.				
Phase 1	110,000	2009	OP	UPG
Reliability - Tranche 2	5,000	2014	OP	UPG
Phase 2A	12,000	2014	OP	UPG
Phase 2B	45,000	2016	UC	UPG
Phase 3	80,000	2017	UC	UPG

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS	TECHNOLOGY
Ivanhoe Energy Inc.				
Tamarack				
Ivanhoe Energy says that it is in ongoing discussions with various stakeholders to recapitalize the company.				
Phase 1	34,784	2017	APPL	UPG
Suncor Energy Inc.				
Base Operations				
Suncor says that oilsands production volumes decreased in the fourth quarter of 2014 compared to the prior year's quarter, primarily due to unplanned maintenance at Upgrader 2. During the quarter, Suncor also completed planned coker maintenance at Upgrader 1.				
U1 and U2	225,000	1967	OP	UPG
Millennium Vacuum Unit	35,000	2005	OP	UPG
Millennium Coker Unit	97,000	2008	OP	UPG
Syncrude Canada Ltd.				
Mildred Lake/Aurora				
Syncrude has filed the regulatory application for the MLX project.				
Base Plant Stage 1 and 2 Debottlenecking	250,000	1978	OP	UPG
Stage 3 Expansion (UE-1)	100,000	2006	OP	UPG
Stage 3 Debottleneck	75,000	TBD	ANN	UPG
SOUTH ATHABASCA REGION — UPGRADER				
CNOOC Limited				
Long Lake				
CNOOC says that first oil from Kinosis 1A has been achieved.				
Phase 1	58,500	2009	OP	UPG
Value Creation Inc.				
Advanced TriStar				
The Alberta Energy Regulator says it will defer decisions on applications for in situ oilsands projects in the new shallow thermal area of the Athabasca region until it has developed formal regulatory requirements. Advanced TriStar is one of five impacted projects.				
ATS-1	12,750	2016	APPL	UPG
ATS-2	25,500	2018	APPL	UPG
ATS-3	25,500	2020	APPL	UPG
TriStar				
Value Creation says it is funded for the Tri-Star project but has not yet decided on a construction timeline.				
Pilot	820	TBD	Approved	UPG
INDUSTRIAL HEARTLAND REGION — UPGRADER				
North West Upgrading Inc.				
Redwater Upgrader				
North West Upgrading says that relatively mild winter conditions have allowed continued good progress at the construction site, where approximately 1,800 people are now at work. Welding and testing has been completed on heavy reactor vessels, and several other major vessels have been recieved at the site.				
Phase 1	50,000	2017	UC	UPG
Phase 2	50,000	TBD	Approved	UPG
Phase 3	50,000	TBD	Approved	UPG
Shell Albian Sands				
Scotford Upgrader				
Marathon Oil Corporation says that a decrease in income for the Athabasca Oil Sands Project in the fourth quarter of 2014 was partially offset by higher net sales volumes.				
Commercial	155,000	2003	OP	UPG
Expansion	100,000	2011	OP	UPG
Value Creation Inc.				
Heartland				
Reports are that Value Creation could be up and running within 18 months of project sanction, but funding remains unclear.				
Phase 1	46,300	TBD	HOLD	UPG
Phase 2	46,300	TBD	Approved	UPG
Phase 3	46,300	TBD	Approved	UPG

GLOSSARY of oil sands terms

ASPHALTENES
The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

BARREL
The traditional measurement for crude oil volumes. One barrel equals 42 U.S. gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

BITUMEN
Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oil sand, but saturation varies.

COGENERATION
The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

COKING
An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

CONDENSATE
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

CONVENTIONAL CRUDE OIL
Mixture of mainly pentane and heavier hydrocarbons recoverable at a well from an underground reservoir, and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

CRACKING
An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

CYCLIC STEAM STIMULATION (CSS)
An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

DENSITY
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light-to-medium crude—oil above this density is deemed as heavy oil or bitumen.

DILBIT
Bitumen that has been reduced in viscosity through addition of a diluent such as condensate or naphtha.

DILUENT
A light hydrocarbon blended with bitumen to enable pipeline transport. See Condensate.

EXTRACTION
A process, unique to the oil sands industry, that separates the bitumen from the oil sand using hot water, steam and caustic soda.

FROTH TREATMENT
The means to recover bitumen from the mixture of water, bitumen and solids "froth" produced in hot-water extraction (in mining-based recovery).

GASIFICATION
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy by-products.

GROUNDWATER
Water accumulations below the Earth's surface that supply fresh water to wells and springs.

HEAVY CRUDE OIL
Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shipped by pipeline.

HYDROCRACKING
Refining process for reducing heavy hydrocarbons into lighter fractions, using hydrogen and a catalyst; can also be used in upgrading bitumen.

HYDROTRANSPORT
A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

HYDROTREATER
An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

IN SITU
A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

IN SITU COMBUSTION
An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then "push" the oil towards the recovery well.

LEASE
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oil sand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

LIGHT CRUDE OIL
Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30-33 degrees API (compared to 32-34 for Light Arab and 37-40 for West Texas Intermediate).

MATURE FINE TAILINGS
A gel-like material resulting from the processing of clay fines contained within the oil sands.

OIL SANDS
Bitumen-soaked sand deposits located in three geographic regions of Alberta: Athabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total in-place deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

OVERBURDEN
A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

PERMEABILITY
The capacity of a substance (such as rock) to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

PETROLEUM COKE
Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

PRIMARY PRODUCTION
An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

RECLAMATION
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

STEAM ASSISTED GRAVITY DRAINAGE (SAGD)
An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

SURFACE MINING
Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

SYNTHETIC CRUDE OIL
A manufactured crude oil comprised of naphtha, distillate and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

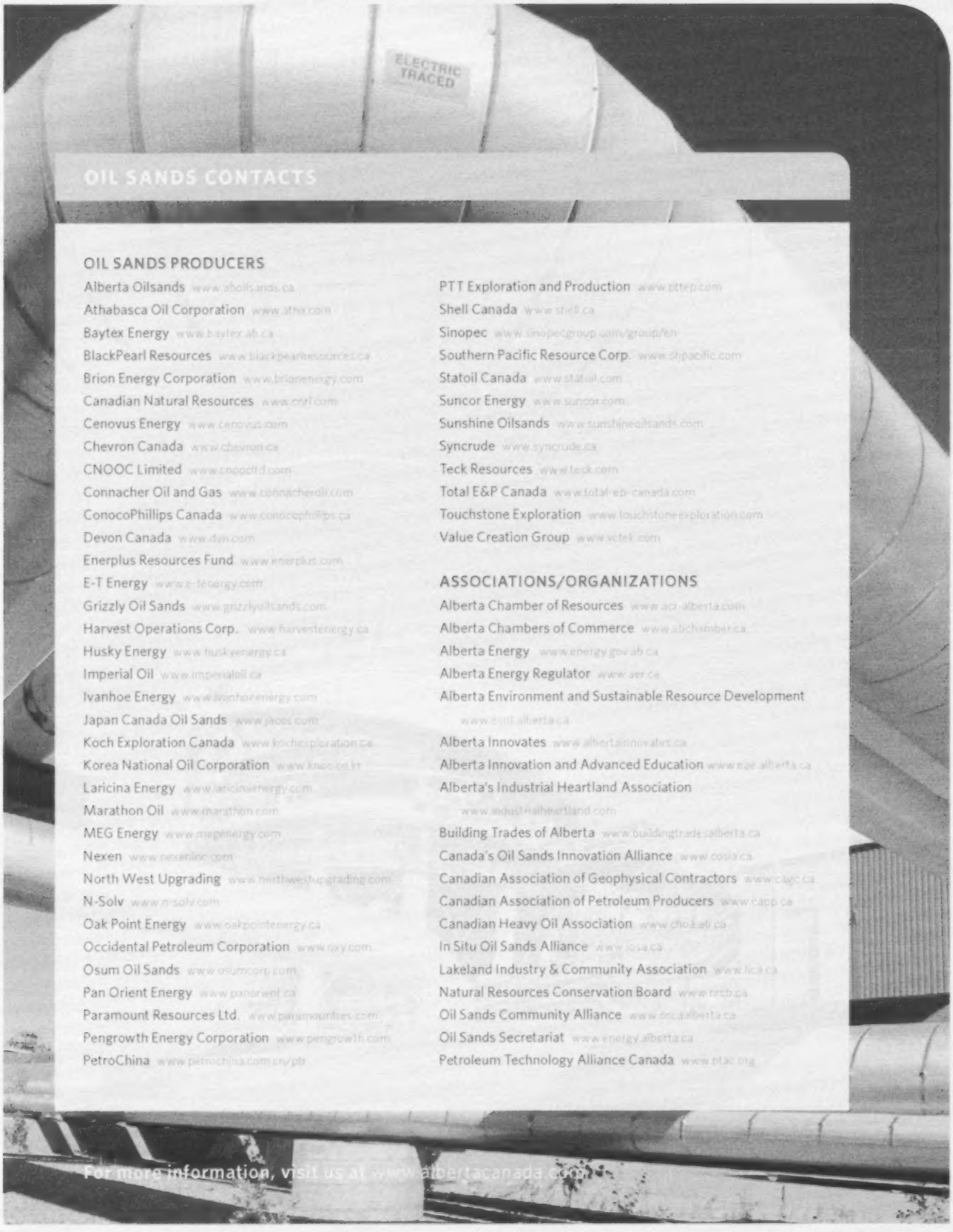
TAILINGS
A combination of water, sand, silt and fine clay particles that is a by-product of removing the bitumen from the oil sand through the extraction process.

TAILINGS SETTLING BASIN
The primary purpose of the tailings settling basin is to serve as a process vessel, allowing time for tailings water to clarify and silt and clay particles to settle so that the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

THERMAL RECOVERY
Any in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

UPGRADING
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

VISCOSITY
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.



OIL SANDS CONTACTS

OIL SANDS PRODUCERS

Alberta Oilsands www.aboilsands.ca
Athabasca Oil Corporation www.athx.com
Baytex Energy www.baytex.ab.ca
BlackPearl Resources www.blackpearlresources.ca
Brion Energy Corporation www.brionenergy.com
Canadian Natural Resources www.cnrl.com
Cenovus Energy www.cenovus.com
Chevron Canada www.chevron.ca
CNOOC Limited www.cnoocltd.com
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Occidental Petroleum Corporation www.oxy.com
Osum Oil Sands www.osumcorp.com
Pan Orient Energy www.panorient.ca
Paramount Resources Ltd. www.paramountres.com
Pengrowth Energy Corporation www.pengrowth.com
PetroChina www.petrochina.com.cn/ptr
PTT Exploration and Production www.pttep.com
Shell Canada www.shell.ca
Sinopec www.sinopecgroup.com/group/en
Southern Pacific Resource Corp. www.shpacific.com
Statoil Canada www.statoil.com
Suncor Energy www.suncor.com
Sunshine Oilsands www.sunshineoilsands.com
Syncrude www.syncrude.ca
Teck Resources www.teck.com
Total E&P Canada www.total-ep-canada.com
Touchstone Exploration www.touchstoneexploration.com
Value Creation Group www.vcteh.com

ASSOCIATIONS/ORGANIZATIONS

Alberta Chamber of Resources www.acr-alberta.com
Alberta Chambers of Commerce www.abchamber.ca
Alberta Energy www.energy.gov.ab.ca
Alberta Energy Regulator www.aer.ca
Alberta Environment and Sustainable Resource Development www.esrd.alberta.ca
Alberta Innovates www.albertainnovates.ca
Alberta Innovation and Advanced Education www.eae.alberta.ca
Alberta's Industrial Heartland Association www.industrialheartland.com
Building Trades of Alberta www.buildingtradesalberta.ca
Canada's Oil Sands Innovation Alliance www.cosia.ca
Canadian Association of Geophysical Contractors www.cagc.ca
Canadian Association of Petroleum Producers www.capp.ca
Canadian Heavy Oil Association www.choa.ab.ca
In Situ Oil Sands Alliance www.iosa.ca
Lakeland Industry & Community Association www.lica.ca
Natural Resources Conservation Board www.nrcb.ca
Oil Sands Community Alliance www.oscaalberta.ca
Oil Sands Secretariat www.energy.alberta.ca
Petroleum Technology Alliance Canada www.ptac.org

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